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# TRAINING PARENTS TO USE THE NATURAL LANGUAGE PARADIGM TO INCREASE THEIR AUTISTIC CHILDREN'S SPEECH

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Parents of four nonverbal and four echolalic autistic children were trained to increase their children's speech by using the Natural Language Paradigm (NLP), a loosely structured procedure conducted in a play environment with a variety of toys. Parents were initially trained to use the NLP in a clinic setting, with subsequent parent–child speech sessions occurring at home. The results indicated that following training, parents increased the frequency with which they required their children to speak (i.e., modeled words and phrases, prompted answers to questions). Correspondingly, all children increased the frequency of their verbalizations in three nontraining settings. Thus, the NLP appears to be an efficacious program for parents to learn and use in the home to increase their children's speech.

DESCRIPTORS: parent training, natural language paradigm, autistic children, speech

One of the most debilitating and difficult to treat characteristics of autistic children is their severe speech deficit (Rutter, 1978). Although researchers have reported success in increasing appropriate speech using clinic-based operant training procedures (e.g., Lovaas, Koegel, Simmons, & Long, 1973), generalized improvement in functional speech has been disappointing (Fay & Schuler, 1980). One strategy used to enhance generalization has been to train parents to deliver the speech therapy; however, problems still remain. Some studies suggest that traditional operant language procedures are difficult and time consuming for parents (e.g., Culatta & Horn, 1981); this perhaps accounts for poor generalization and maintenance of parent-training results (e.g., Harris, Wolchik, & Weitz, 1981).

To address the problems associated with traditional operant language training procedures, researchers have explored the use of more natural and loosely structured language procedures such as incidental teaching (Hart & Risley, 1968, 1974, 1975, 1980), mand-model (Rogers-Warren & Warren, 1980), and time delay (Charlop, Schreibman, & Thibodeau, 1985; Halle, Baer, & Spradlin, 1981). Recently, another natural language procedure, the Natural Language Paradigm (NLP), was designed for use with autistic children in a clinic setting (Koegel, O'Dell, & Koegel, 1987). The NLP is similar to the mand-model, in which teachers systematically prompt verbalizations with mands, model verbalizations if necessary, and provide reinforcement following appropriate verbalizations during the children's play and preschool activities. However, the NLP procedures differ from other natural language programs by combining several

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of the positive features of both traditional operant procedures and natural language procedures. Play sessions are specifically presented, during which massed opportunities are provided for the child to use speech, and *all* verbal attempts are reinforced even though they may not be as elaborate or clear as previously emitted. A rapid exchange of the toys continues between the child and therapist while a wide variety of words and phrases are modeled for the child. Thus, the NLP is a child-initiated protocol designed to increase motivation by varying tasks (Dunlap, 1984), increase responding by providing direct reinforcers (Koegel & Williams, 1980), and enhance generalization through loose structure and multiple exemplars (Stokes & Baer, 1977).

The present study expands upon the results of Koegel et al. (1987), who initially demonstrated the efficacy of this promising language program. Their data suggested that, when used in a clinic setting with trained therapists, the NLP produced more generalized speech for two autistic children than did traditional operant procedures. The present study was designed to enhance the effects of the NLP on increasing generalization of speech by teaching parents to use the procedures in the home. In our study, parents of 8 autistic children were trained to use the NLP, and the effects of training on parent–child verbal interactions were examined in three generalization settings.

## METHOD

### *Subjects*

Participants were 7 autistic boys and 1 autistic-like girl (ages 5 to 9.6 years old) and their primary caretakers. The children were diagnosed by two independent agencies according to the criteria established by National Society for Autistic Children (Ritvo & Freeman, 1978).

The nonverbal children (Children 1 through 4) were 5.8, 5.9, 5, and 9.6 years old with mental ages of 2.7, 3.10, 1.7, and 2.9 years. Children 1, 2, and 4 could imitate only sounds and a few words upon request, rarely initiated speech, and had receptive vocabularies under approximately 15 words. Child 3 was functionally mute and had no receptive vocabulary. The 4 echolalic children (Children 5 through 8), aged 6.2, 8.11, 5.4, and 6.2 years old with mental ages of 3.10, 3.7, 4.7, and 6.6 years, respectively, had larger vocabularies and occasionally used short phrases. However, they rarely spoke spontaneously and their speech repertoires consisted primarily of highly specific, previously trained responses. All children were deficient in academic skills and social and play behaviors, and engaged in self-stimulatory behaviors.

To control for maturation, 6 nonhandicapped children and their mothers served as comparison subjects. The children, aged 2.2, 2.7, 3.9, 5.7, 6.7, and 9.8 years, were selected to match approximately the chronological and mental age range of the autistic children. The younger siblings (ages 2.8, 3.9, and 3.10 years) of 3 autistic boys also participated to permit assessment of generalization of parent behavior.

### *Parent Training*

Parent training in NLP procedures was conducted in a small (2.9 by 2.9 m) therapy room equipped with a table and two small chairs. Parent and child participants sat facing each other at the side of the table with toys placed on the floor adjacent to the parent.

Over successive 15-min individual parent-training sessions, parents received (a) a discussion of the NLP procedures, (b) two observations of therapists conducting the NLP with the child (one through a one-way mirror and one in the therapy room), and (c) in vivo training. The experimenter was in the room during the first two or three in vivo training sessions and subsequently observed through a one-way mirror and provided feedback by intercom. Parents received a minimum of five and a maximum of nine training sessions until they reached the preestablished criterion (described below) for conducting the NLP. Parent behaviors were scored during a 10-min NLP session using a 10-s continuous partial interval scoring procedure along the four basic criteria of the NLP. Assessment of parents' proficiency in conducting the NLP began in the fourth training session and continued until parents met criterion in two consecutive training sessions. All parents met criterion within nine sessions.

*NLP criterion.* Four key components of the

NLP were used as criteria to assess parents' NLP proficiency and to establish when training was complete. Criterion levels were previously derived from careful observations of clinical staff conducting the NLP and from those used in Koegel et al. (1987). (A manual detailing the procedures for training parents can be obtained from the first author upon request.)

*(a) Direct reinforcement of verbal attempts.* With the NLP, the object or activity and praise are used to reinforce *all* of the child's verbal attempts even if they are not as clear or accurate as previous attempts. For example, if the parent models "throw ball" and the child responds "ba," he receives the ball as direct reinforcement for the vocalization. To meet criterion, parents were required to reinforce 85% or more of their child's communicative attempts.

*(b) Turn-taking with the stimulus material.* During an NLP session, control of the stimulus material passes frequently between the parent and the child. Thus, the parent takes a turn with the toy and models a target response (a verbalization about that toy), the child receives the toy (for approximately 10 s) following a verbal or communicative attempt, and then the parent has another turn or models another word or phrase. To meet criterion, control of the stimuli was required to pass between parent and child in at least 50% of the intervals.

*(c) Task variation and multiple exemplars.* The NLP uses a variety of tasks to illustrate the meaning of a given word or activity. Identical words are paired with different referents (e.g., one can "turn on" the music box or "take turns"; and one can "open" a box or "open" the door) and different actions are paired with identical referents (e.g., one can "blow" and/or "pop" bubbles). Parents were required to change stimulus materials and/or the words modeled in at least 50% of the intervals.

*(d) Shared control.* Shared control occurs when the child is given the opportunity to select a new toy, when a change in the play activity occurs following the child's verbal request or gesture to do so, and when the parent allows the child to change the target word or phrase. For example, the parent models "blow bubbles," the child changes the phrase to "pop bubbles," and the parent acknowledges by repeating "pop bubbles." Shared control needed to occur at least five times during the session.

### *Parent–Child NLP Training Sessions*

After the second NLP parent-training session, parents were instructed to conduct 15-min NLP sessions in the home four times per week. Thus, for several weeks, parents simultaneously received NLP training at the clinic and conducted NLP sessions at home. Once parents met the NLP criterion, parent–child NLP sessions took place only in the home (usually in the child's bedroom or in the living room). Additionally, parents were asked to maintain a self-report log of the dates, times, and duration of NLP sessions and to note any problems they were having for later discussion.

### *Baseline and Posttreatment Generalization Probes*

*Settings and materials.* Generalization measures of parent–child verbal interactions for the autistic children were taken in three locations: a large play room (not associated with therapy or training) located at the clinic, a free-play setting in the child's home, and the clinic break room where parents and therapists observe children during treatment and where children usually take periodic breaks from their ongoing behavior therapy. Parent–child verbal interaction probes for the siblings and nonhandicapped comparison group were taken only in the clinic play room.

A variety of age-appropriate toys (e.g., puppets, balls, blocks) were used during all NLP training sessions and generalization probes.

*Behavioral definitions.* Three categories of behavior were observed during the generalization probes and were based in part on those used by Koegel et al. (1987). The first, *parent verbalizations,* occurred when the parent provided a discriminative stimulus for speech by requesting any kind of vocalization. This included the parent modeling word(s) to be imitated (e.g., "I want car," "Block is big") and asking a question (e.g., "What do you want?").

*Child vocalizations* included imitations, which were verbal responses corresponding to the immediately preceding parents' model; answers, which were responses that were contextually related to an immediately preceding verbal discriminative stimulus such as "What is this?"; and spontaneous speech, defined as vocalizations that did not have an immediate verbal discriminative stimulus but were related to the context of the play session.

The frequency of *echolalia* was observed as an ancillary behavior. Immediate echoes were defined as inappropriate repetitions of words or phrases just emitted by the parent (e.g., in response to "What do you want?" the child responds, "What do you want?"). In contrast, imitations were appropriate repetitions, such as when the parent models "The ball is red" and the child responds "The ball is red." Similarly, delayed echoes were defined as nonfunctional repetitions that were out of context with the play activities (e.g., while playing ball the child recites lines from a TV commercial).

*Design and procedures.* A multiple baseline design across subjects was used with verbal interaction probes for the autistic children obtained in the three generalization settings described above. Four probes were obtained with the nonhandicapped comparison children at monthly intervals. A multiple baseline was used for probes of parents with their autistic children's siblings.

Baseline probes in the clinic play room were obtained during weekly 10-min sessions videotaped through a one-way mirror and were later scored using a 10-s continuous partial interval scoring procedure. Posttreatment probes began 1 week after parents met NLP criterion. Before each observation, parents were instructed to engage in free-play activities with their child including toy play, cuddling, and conversation. Parents were accustomed to this instruction and to the videotaped free-play sessions, because similar procedures were a routine part of the clinic's ongoing program evaluation. Further, probes were intermixed with the program evaluation free-play sessions to reduce demand characteristics.

Home free-play probes were also obtained during 10-min videotaped sessions at sites selected by parents. Parents were asked to assemble a variety of toys and play with their child. Video equipment was placed as far away as possible, and the camera operator remained in another room during taping. Home probes were randomly interspersed and scheduled at parents' convenience.

Break room data were collected during 5-min segments of the children's break from therapy at 1- to 2-week intervals, and were recorded on video equipment placed at one end of the room. Once again, parents were accustomed to recording devices in this room.

### *Reliability*

Observers were graduate and undergraduate students working at the behavior therapy clinic. Using previously recorded sample probes, observers were trained (i.e., trial scoring, feedback, rescoring) to score video recordings of parent–child interactions. Actual coding began when interobserver reliability reached 85% on the sample tapes.

*Parent-training sessions.* Interobserver reliability of parents' proficiency in using NLP procedures was obtained on 65% of the NLP parent-training sessions with percentage agreements calculated by dividing agreements by the total number of agreements plus disagreements for each behavior and multiplying by 100. Mean point-by-point agreement percentages for occurrences and nonoccurrences, respectively, were: reinforcing attempts, 88% (range, 77% to 98%) and 89% (range, 79% to 98%); turn-taking, 84% (range, 79% to 88%) and 86% (range, 80% to 88%); task variation, 89% (range, 80% to 95%) and 90% (range, 81% to 96%); and shared control, 94% (range, 85% to 97%) and 97% (range, 88% to 97%).

*Parent–child generalization probes.* Interobserver reliability was obtained on 49% of all generalization probes and was calculated as described above. In the clinic and home free-play settings, agreement for occurrence and nonoccurrence of parent verbalizations was 90% (range, 66% to 100%) and 89% (66% to 100%), respectively. For the combined category, child vocalizations (imitations,

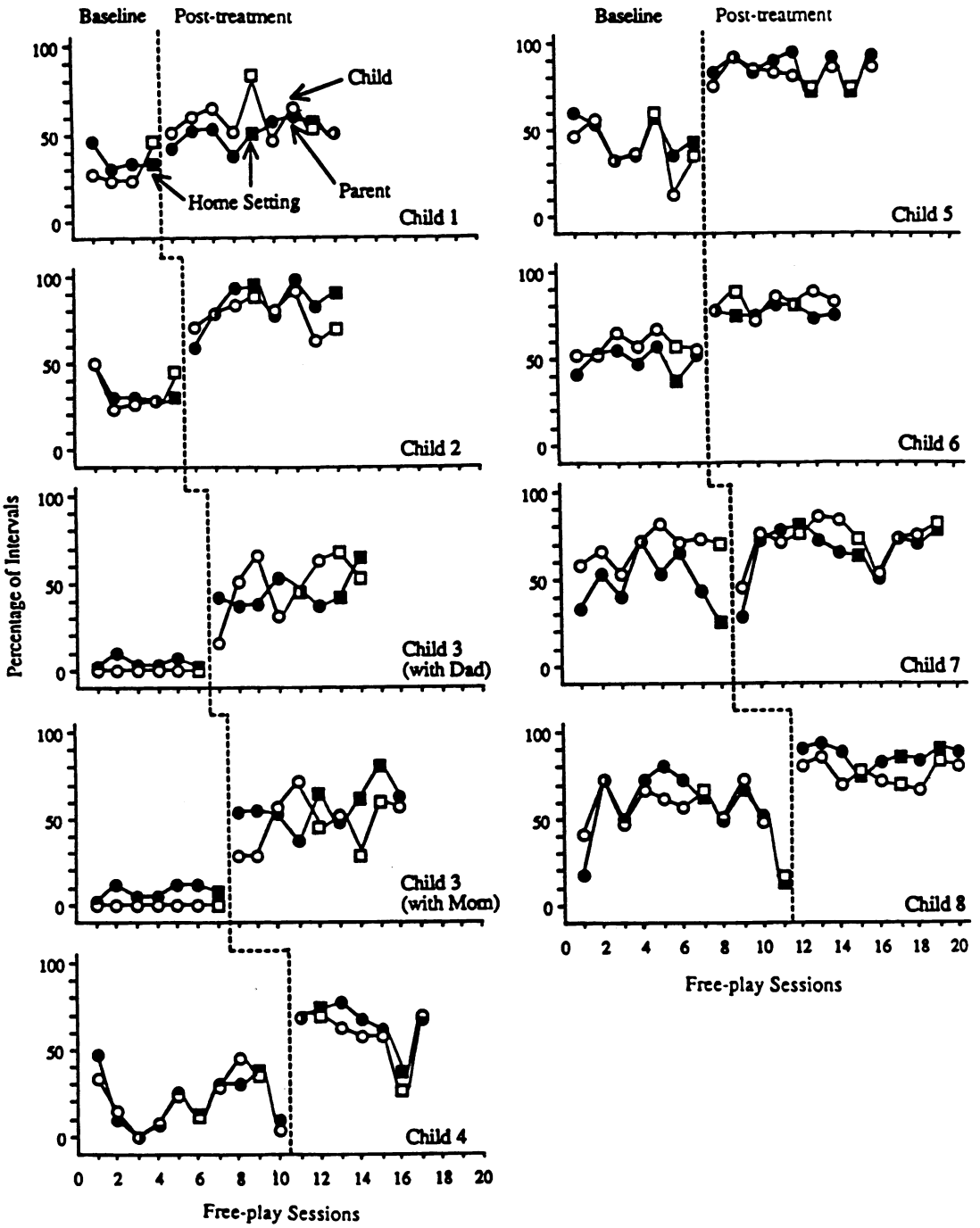


Figure 1. Parent verbalizations and child vocalizations (combined imitations, answers, and spontaneous speech) in the free-play settings.

answers, and spontaneous speech in the clinic and home free-play settings), mean occurrence and nonoccurrence agreement was 87% (range, 69% to 100%) and 96% (range, 88% to 100%), respectively, and 96% (range, 88% to 100%) and 97% (range, 89% to 100%) for echolalia. In the break room, mean occurrence and nonoccurrence reliability was 78% (range, 50% to 100%) and 91% (range, 67% to 100%) for parent verbalizations, 87% (range, 67% to 100%) and 90% (range, 77% to 100%) for child vocalizations, and 96% (range, 88% to 100%) and 97% (range, 89% to 100%) for echolalia.

## RESULTS

### *Changes in Parent and Child Verbal Behavior*

*Free-play settings.* Changes in the parents' and their autistic child's verbal behavior are presented in Figure 1. All parents increased the percentage of intervals in which they presented a discriminative stimulus to which their child could respond vocally. The greatest increase was seen in the verbalizations of Child 2's mother (baseline $M$ = 34%; posttreatment $M$ = 84%) and the smallest, but still substantial, gain seen with Child 7's mother (baseline $M$ = 48%; posttreatment $M$ = 67%).

All children increased the percentage of intervals in which they vocalized. Child 3, who was the least verbal during baseline, showed the greatest gains (baseline $M$ = 0%; posttreatment $M$ = 27%). In contrast, Child 7, who was the most verbal during baseline, showed only minimal gains (baseline $M$ = 68%; posttreatment $M$ = 72%).

*Break room setting.* Posttreatment increases in parent verbalizations were observed for all but one of the caregivers (Child 4's aunt), with greatest gains seen for parents of Child 2 (baseline $M$ = 4%; posttreatment $M$ = 47%) and parents of Child 6 (baseline $M$ = 4%; posttreatment $M$ = 62%) (see Figure 2). Correspondingly, posttreatment increases in child vocalizations were observed for all children, with greatest gains observed for Child 8 (baseline $M$ = 11%; posttreatment $M$ = 62%) and Child 6 (baseline $M$ = 13%; posttreatment $M$ = 65%).

### *Comparative Data*

*Parent verbalizations.* Posttreatment increases of lower magnitude were also observed in parent verbalizations with the siblings. Baseline and posttreatment means and ranges were: Sibling 1, baseline $M$ = 50% (48% to 51%) and posttreatment $M$ = 65% (57% to 75%); Sibling 2, baseline $M$ = 48% (42% to 58%) and posttreatment $M$ = 67% (57% to 77%); Sibling 3, baseline $M$ = 33% (30% to 35%) and posttreatment $M$ = 45% (33% to 64%). This suggests that the parents were also more verbal with their other children after the NLP training.

Parent verbalizations for the comparison mothers of nonhandicapped children were generally lower and relatively stable across the four monthly probes, with means and ranges for each of 29% (15% to 42%), 27% (20% to 33%), 24% (22% to 27%), 25% (13% to 37%), 21% (18% to 27%), and 12% (7% to 17%).

*Child vocalizations.* Table 1 presents the mean and range of each child's vocalization by type (imitation, answers, and spontaneous speech) in the clinic free-play setting. Data obtained in the home free-play and break room settings are not presented; however, individual children's verbal behavior was similar across all settings. Increases in imitations were observed for all of the autistic children, with the greatest increases observed with Children 2, 5, and 8. Answers increased for 4 of the autistic children (Children 1, 2, 4, and 5), remained relatively unchanged for Children 6 and 7, and decreased for Child 8. Slight increases in spontaneous speech were observed for Children 1, 3, 6, and 8, whereas others remained relatively stable.

For the siblings, slight increases were observed in imitation for Sibling 2, in answers for Siblings 2 and 3, and in spontaneous speech for Sibling 3. As expected, the frequency of vocalizations for the nonhandicapped children remained relatively unchanged across the four probes. Although these data varied considerably from posttreatment data in terms of frequency and content of verbalizations, when considered from a normative perspective they must be considered in the context of the purpose of our

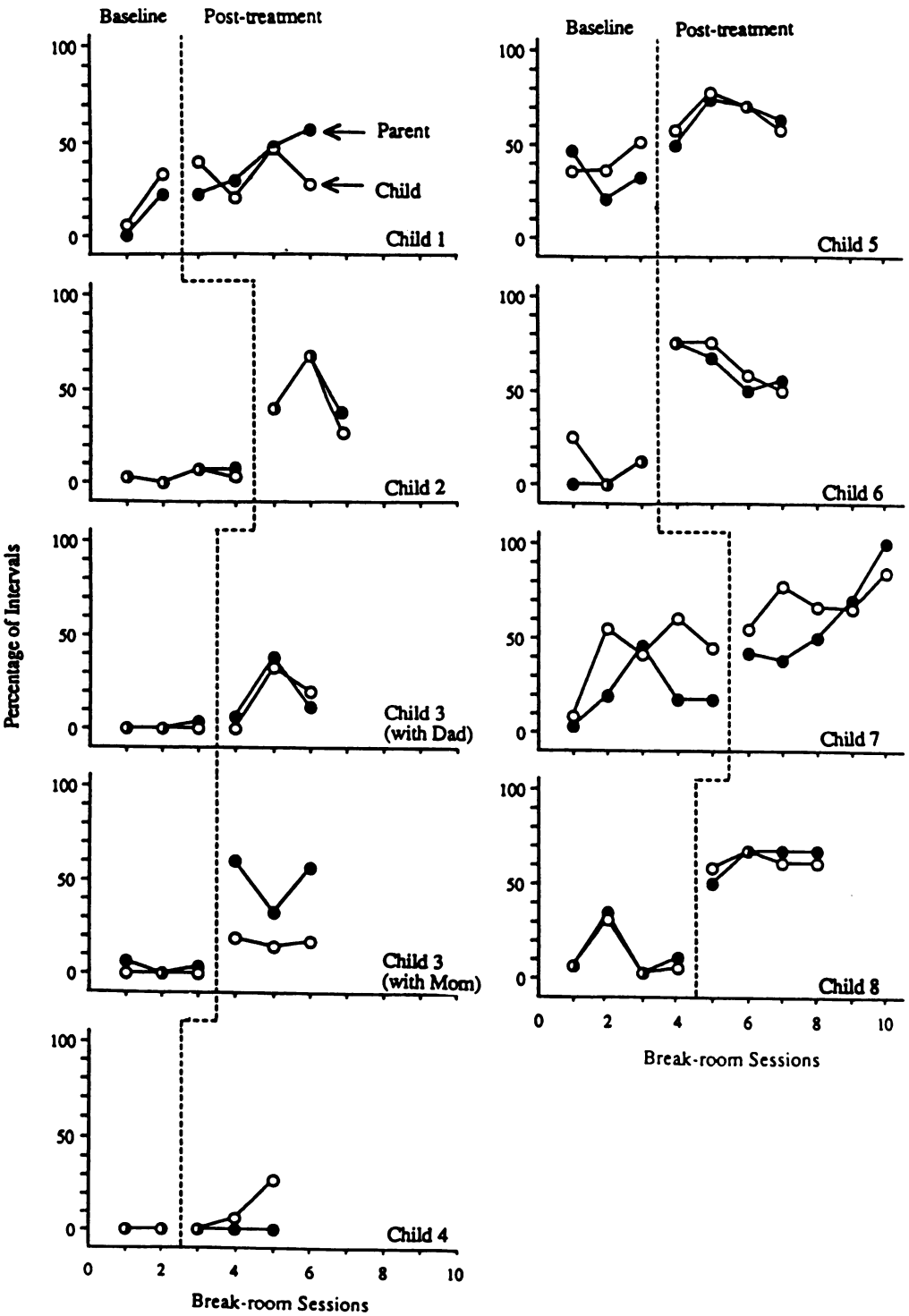


Figure 2. Parent verbalizations and child vocalizations (combined imitations, answers, and spontaneous speech) in the break room setting.

Table 1
Mean (and Range) Percentage of Intervals of Child Vocalizations in Clinic Free-Play Setting

| | Imitations | | Answers | | Spontaneous | |
|---|---|---|---|---|---|---|
| | Baseline | Post-treatment | Baseline | Post-treatment | Baseline | Post-treatment |
| | | | Autistic children | | | |
| 1 | 7 (2–10) | 14 (8–20) | 13 (2–20) | 23 (10–37) | 6 (2–10) | 29 (20–40) |
| 2 | 21 (5–23) | 66 (56–77) | 11 (3–19) | 23 (10–38) | 1 (0–3) | 7 (0–20) |
| 3 With Dad | 0 | 21 (15–25) | (Not measured) | | 0 | 27 (7–52) |
| 3 With Mom | 0 | 29 (20–37) | (Not measured) | | 0 | 26 (0–65) |
| 4 | 16 (0–38) | 47 (37–63) | 4 (0–12) | 23 (10–37) | 1 (0–7) | 2 (0–5) |
| 5 | 6 (2–11) | 54 (40–72) | 19 (5–32) | 33 (13–53) | 17 (7–25) | 13 (5–22) |
| 6 | 9 (5–15) | 39 (30–47) | 46 (37–52) | 41 (33–50) | 14 (8–20) | 29 (12–43) |
| 7 | 4 (0–15) | 8 (2–14) | 41 (23–50) | 43 (33–52) | 29 (21–43) | 35 (17–57) |
| 8 | 13 (3–25) | 51 (40–60) | 40 (25–55) | 20 (15–28) | 12 (0–25) | 27 (15–33) |
| | | | Siblings | | | |
| 1 | 20 (18–22) | 15 (7–22) | 29 (26–32) | 38 (28–48) | 35 (28–43) | 35 (30–40) |
| 2 | 6 (3–7) | 18 (3–35) | 34 (33–35) | 48 (43–52) | 29 (20–40) | 28 (20–33) |
| 3 | 3 (0–5) | 4 (3–5) | 22 (10–35) | 39 (30–59) | 29 (22–35) | 45 (31–55) |
| | | | Comparison children | | | |
| 1 | 14 (2–22) | | 10 (5–18) | | 28 (15–42) | |
| 2 | 1 (0–3) | | 17 (15–22) | | 31 (13–50) | |
| 3 | 1 (0–3) | | 25 (22–28) | | 30 (23–42) | |
| 4 | 0 | | 19 (11–27) | | 33 (7–60) | |
| 5 | 1 (0–3) | | 17 (13–22) | | 28 (23–35) | |
| 6 | 0 | | 11 (8–18) | | 46 (30–57) | |

intervention, which was to increase the autistic children's vocalizations and the frequency with which parents set the occasion for speech.

### *Ancillary Child Behavior: Echolalia*

There was no echolalic behavior observed throughout the study for Children 2, 3, 4, or 7. In the free-play settings, slight posttreatment decreases were observed in the echolalic behavior of Child 1 (baseline $M$ = 3%; posttreatment $M$ = 1%), Child 6 (baseline $M$ = 30%; posttreatment $M$ = 19%), and Child 8 (baseline $M$ = 11%; posttreatment $M$ = 3%). No differences in echolalia were observed in the break room.

## DISCUSSION

This study presented a promising new parent-training program designed to increase autistic children's verbal behavior. Posttreatment increases in parents' requests for vocalizations from their autistic children were observed in the generalization set-

tings. Additionally, parents showed evidence of generalizing these behaviors with the siblings of their autistic children. These generalization effects are encouraging in that they may provide additional support for the motivating qualities of natural language programs for both parent and child (Halle, 1984).

The autistic children appeared to be more verbally responsive following NLP training. This is quite noteworthy given that the primary reinforcement for parents in promoting verbal skills is often successful communication and changes in the child's communicative competence (Rogers-Warren & Warren, 1984). In addition, increases in children's appropriate speech were not accompanied by increases in echolalia. Perhaps the NLP took advantage of the children's echolalia by converting it to appropriate imitative speech (Charlop, 1983; Prizant, 1984).

It was also important to determine whether parents maintained the training sessions in the home. According to their self-report logs, parents of the nonverbal children reported that they consistently implemented the program, whereas only one of the parents of the echolalic children reported doing so. The children did, however, increase their speech in spite of their parents' inconsistent use of the NLP, which suggests that the NLP procedures may be quite powerful in eliciting speech. Additionally, the parents who did not conduct regular NLP sessions did report that they were incorporating principles of NLP into their daily routine with their child. This suggests the need for future research to train parents on how to incorporate NLP techniques into their daily routine.

Interpretation of these data raises some questions that might also be addressed in future research. First, we cannot rule out the effect of demand characteristics inherent in the baseline probes in which parents were given only the general instruction to engage in free-play activities rather than to target speech specifically. Second, although changes were observed in parent–child interactions during clinic and home probes, parents may not have been interacting similarly when not under observation. Third, the logs maintained by parents were self-report measures and as such contained no independent validation of their accuracy. Future research is needed to assess more adequately parents' long-range proficiency in conducting the NLP and continued use of the NLP in the home. Fourth, parents and children in this investigation were concurrently participating in a behavioral clinic program that may have influenced acquisition of NLP training skills. Finally, some measures of social validation may determine the naturalness and appropriateness of parents' interactions and the children's speech following NLP training. Efforts are currently underway to address some of these issues.

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